The invention relates to a method of improving the properties of urea granulates, more especially the tendency towards caking, dust formation and foaming characteristics in aqueous media, by the addition of an additive to the urea.

More specifically, the paragraph bridging pages 1-2 and the first sentence of the first full paragraph on page 2 of the specification, state the following:

In view of the problems still present in the handling of the urea granulates, there is still a need for a chemical product, which can be used as an additive for urea to decrease both the caking tendency and the dust formation of the granules. This compound should be added in a small quantity on the surface of the granulates, have a low prize, a good efficiency, be non-foaming and environmentally friendly.

It is therefore an object of the invention to provide such a compound.

Applicants have found a solution to the above-described problems by treating granules with a specific carboxylic acid compound, as defined in claim 1. The effect of the carboxylic acid compound is believed to be due its strong affinity for water, and also that it provides a re-crystallisation effect on the surface of the granules to form a protective surface layer of urea-carboxylic acid. It is believed that this contributes to reduced caking, dust formation and foaming.

Nabiev et al.

The Nabiev et al. reference teaches:

Closest to the proposed invention in technical nature is a method of producing a solid granulated ammonium nitrate by treating granules of the fertilizer first with nitric acid and then neutralizing them with gaseous or liquid ammonia [2]. A shortcoming of this method is that ammonium nitrate, which is a hygroscopic compound that tends to cake, additionally forms on the surface (see page 2, lines 9-13).

This information suggests to a person of ordinary skill in the art that it is insufficient to treat fertilizer granules that tend to cake with an acid which is subsequently neutralized forming a hygroscopic compound on the surface of the granule. The solution to this problem, according to the reference is as follows:

The goal is achieved in that ammonium complexes of copper, zinc, cobalt, or nickel are used as the ammonium compound. Nitric, sulphuric, phosphoric, oxalic, or succinic acids are used at the acid, and the ammonia complexes are added in the amount of 5 – 30 % of the weight of the fertilizer (see page 2, lines 16-18).

In view of the above teaching, a person of ordinary skill in the art would recognize that the problem in the prior art can be solved by forming a coating (i.e., a shell) of ammonia compounds on fertilizer granules that **are not** hygroscopic.

This solution is found in Example 2 of the reference, which demonstrates the treatment of urea granules, as follows:

> *...0.7 g succinic acid (concentration 30 %)...is sprayed onto 100 g granular urea (or ammonium nitrate) while stirring the fertilizer, and then the fertilizer is treated for 1-5 min...with 30 g ammonium complex...After drying, a granular fertilizer with a coating of ammonium complex is obtained* (see page 2, line 21 – page 3, line 4).

This disclosure in the reference directly and unambiguously teaches a person of ordinary skill in the art that the caking problem is solved by forming **a coating of an ammonium complex.**

Accordingly, the essential features of the method of Nabiev et al. are:

(1) first treating the granules with an acid, and then

(2) treating with an ammonium complex to form a coating.

On the other hand, the essential feature of the claimed method is:

(1) treating the granules with an acid.

One of ordinary skill in the art would recognize that the reference requires two steps to prepare the essential coating of an ammonium complex, whereas the claimed invention requires the single step of adding a carboxylic acid compound to the surface of urea granules.

Therefore, the Nabiev et al. reference does not teach the substantially same composition, formed in substantially the same manner for substantially the same purpose, as the claimed invention.

Accordingly, Applicants take the position that claims 1, 10 and 14 are not anticipated by the Nabiev et al. reference.

Claims 2-8 and 11-13 depend directly or indirectly from claim 1 or 10, and thus also are not anticipated by the reference.

Therefore, reconsideration and withdrawal of the rejection are respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-5 and 8-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Snartland et al. (WO 99/15480).

Claim 16 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Nabiev et al., as applied to claims 1-8 and 10-14, and further in view of Christoffel et al. (US 3,392,007).

Claim 16 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Snartland et al., as applied to claims 1-5 and 8-15, and further in view of Christoffel et al.

These rejections are respectfully traversed.

The arguments above regarding Nabiev et al. are also applicable to these rejections. The Snartland et al. reference is consistent with the teachings of Nabiev et al, because it also teaches that is it necessary to form a coating or shell on the fertilizer granule by first treating the granule with a mineral acid and then treating it with a mineral base (see page 4, paragraph 2). Thus, this reference also teaches the essential features of (1) treating urea granules with an acid, and then (2) treating with an ammonium complex to form a coating.

The claimed invention does not require a second step of treating with an ammonium complex to form a coating, because a specific carboxylic acid of formula XY-(Z)-COOH is employed.

The objective problem in the art solved by the claimed invention is a simplified method to reduce the caking of the fertilizer granules. There is nothing in the cited references that discloses or suggests to a person of ordinary skill in the art that simplifying the methods described in the references, and thus only treating the granules with an acid (the first step without the second step), would provide a similar effect on the obtained fertilizer granules.

Both Nabiev et al. and Snartland et al. clearly teach that the anti-caking effect is obtained by forming a shell coating, and each reference discusses the effect of the shell coating and provides examples of forming the shell coating. Accordingly, one of ordinary skill in the art would have had no reason or rationale to omit the second step of treating with an ammonium complex to form a shell coating with a reasonable expectation of success of obtaining the same effect.

Thus, the Examiner has used Applicants' own disclosure as a roadmap in finding the present claims obvious over the references. Thus, the rejection is based upon impermissible hindsight reasoning.

Moreover, Applicants note that the use of the term "coating" in the present specification (see, e.g., page 3, line 21 and page 6, line 6) does not mean that the claimed invention teaches to form a shell on the granules. The claimed invention treats the surface (i.e., coats the surface) with a dilute acid solution which is subsequently dried. This means that there will be some acid added to the surface of the granules. However, in the cited references, first an acid solution is added, and then a base compound reacts with the acid to form a salt, which then is dried to form a solid salt layer (i.e., a shell) on the granules. Thus the term "coating" in the present application and the cited references has different meanings.

Accordingly, Applicants take the position that claims 1, 10 and 14 would not have been obvious over Snartland et al.

Claims 2-5 and 8, 9 and 11-13 depend directly or indirectly from claim 1 or 10, and thus also are not anticipated by the reference.

The Examiner admits that Nabiev et al. and Snartland et al. do not disclose that during the addition of the solution the temperature of the urea is 40-70°C, as recited in claim 16, and cites Christoffel et al. for disclosing free flowing fertilizers coated with an aqueous acid solution, wherein urea is coated at a temperature of 25-90°C. However, the Christoffel et al. reference provides no reason or rationale to omit the second step of treating with an ammonium complex to form a shell coating, as taught by Nabiev et al. and Snartland et al.

Therefore, claim 16 would not have been obvious over Snartland et al. in view of Christoffel et al. or Nabiev et al. in view of Christoffel et al.

Conclusion

Therefore, in view of the foregoing remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

If, after reviewing this Response, the Examiner finds there are any issues remaining which must be resolved before the application can be passed to issue, she is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

Erik BIJPOST et al.

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